US009636463B2

(12) **United States Patent**
Kakiuchi et al.

(10) **Patent No.: US 9,636,463 B2**
(45) **Date of Patent: May 2, 2017**

(54) **COMBINATION CONTAINER/SYRINGE**

(75) Inventors: **Makoto Kakiuchi**, Takahagi (JP); **Harumi Kakiuchi**, legal representative, Takahagi (JP); **Seiji Shimazaki**, Takahagi (JP)

(73) Assignee: **ARTE CORPORATION**, Tokyo (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 800 days.

(21) Appl. No.: **13/983,298**

(22) PCT Filed: **Feb. 2, 2012**

(86) PCT No.: **PCT/JP2012/052359**
§ 371 (c)(1),
(2), (4) Date: **Aug. 1, 2013**

(87) PCT Pub. No.: **WO2012/105640**
PCT Pub. Date: **Aug. 9, 2012**

(65) **Prior Publication Data**

US 2014/0048432 A1 Feb. 20, 2014

(30) **Foreign Application Priority Data**

Feb. 2, 2011 (JP) 2011-021006

(51) **Int. Cl.**
A61M 5/28 (2006.01)
A61J 1/00 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***A61M 5/286*** (2013.01); ***A61J 1/00*** (2013.01); *A61M 5/347* (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC A61M 5/286; A61M 2005/287; A61M 2005/3132; A61M 2005/3123
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2,591,046 A 4/1952 Brown
4,439,184 A * 3/1984 Wheeler A61M 3/005 604/191
(Continued)

FOREIGN PATENT DOCUMENTS

CN 1080874 1/1994
CN 1080874 A 1/1994
(Continued)

OTHER PUBLICATIONS

European Search Report issued in EP Application No. 12741652.7-1662 dated Mar. 4, 2015, 6 pages.
(Continued)

Primary Examiner — Andrew Gilbert
(74) *Attorney, Agent, or Firm* — Nixon Peabody, LLP; Khaled Shami

(57) **ABSTRACT**

A combination container/syringe (**1**) provided with an outer cylinder (**10**) that forms a cylindrical shape centered on an axial line (O); a front stopper that is inserted into a distal end side of the outer cylinder (**10**); and a cylindrical tip (**50**) that is fitted to an outer periphery of the distal end of the outer cylinder via a fitting hole (**61**) at a base end side, and that has a bypass chamber (**71**) that houses the front stopper at a front side of the fitting hole, in which an inner diameter of the bypass chamber is formed larger than an outer diameter of the front stopper, and a plurality of ribs (**74**) that protrude toward an inside in a radial direction and extend in the direction of the axial line to make close contact with the outer peripheral surface of the front stopper that has moved to the inside of the bypass chamber are provided spaced apart in a circumferential direction on the inner peripheral surface (**73**) of the bypass chamber. According to this combination container/syringe, it is possible to effectively eliminate air bubbles in a medicinal solution via a medicinal solution flow-through space that is formed over the circum-
(Continued)